COLOUR TEXTURE IMAGE CLASSIFICATION USING COLOUR COMPLETED LOCAL BINARY PATTERN (CCLBP)

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Computer Science (Graphics & Multimedia Technology)

Faculty of Computer Systems and Software Engineering

UNIVERSITI MALAYSIA PAHANG

MAY 2019

ACKNOWLEDGEMENTS

To begin with, I am grateful to Allah for the good health and wellbeing that were necessary to complete this project. I place on record, my sincere thank you to Prof. Dr. Kamal Zuhairi Zamli Dean of the Faculty, for the continues encouragement. I am also grateful to my supervisor Dr. Taha Hussein Rassem, I am extremely thankful and indebted to him for sharing expertise, and sincere and valuable guidance and encouragement extended to me. I take this opportunity to express gratitude to all the Department faculty members for their help and support. I also thank my parents for the unceasing encouragement, support and attention. I also place on record, my sense of gratitude to one and all, who directly or indirectly, have lent their hand in this project.

ABSTRACT

Local Binary Pattern (LBP) descriptor is being used successfully for the classification of textures. Also, it is been used for other tasks such as facial expression, face recognition and texture segmentation. On the other hand, these descriptors are barely used for image categorization due to their calculations which are depend on the gray image and they are invariant to monotonic light variations on the gray level. Despite the key role in distinctive the objects of these descriptors, they ignore color information. In this project, Completed Local Binary Pattern (CLBP) will be enhanced and two colour CLBP descriptors are proposed which RGB_CCLBP and HSV_CCLBP. Moreover, the datasets that have been used in this project are KTH-TIPS, KTH-TIPS 2A and Outex_TC_00013 datasets. The proposed method shows promising results despite the limitations of it.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, texture features are spirited in many applications such as face recognition, finger detection, human detectors, object recognition and image retrieval. In addition, many of textures feature algorithms were identified by pervious literature for robust and distinctive texture features. The classification of the texture feature algorithm methods is categorised into three categories which are model-based method, statistical method and structural method.

The difference between the grey level of centre pixel of a specific local pattern and its neighbours are calculated to a histogram that is represent image texture. Then, the absolute difference was used for constructing Local Binary Pattern (LBP) descriptor. By the ability to distinguish the microstructures of an image, LBP became an interesting research topic used by many of the computer vision researchers. Also, LBP used for rotation invariant texture classification and extended for face recognition and image retrieval applications (García-Olalla, Alegre, Barreiro, Fernández-Robles, & García-Ordás, 2015).

LBP has two steps which are thresholding and encoding steps. The values of the neighbouring pixels are converted into binary values (0 or 1) by comparing value of central pixel with value of all neighbouring pixel. Then, to describe a structural pattern, encoding step converts the binary values into decimal numbers. Moreover, many LBP

variants have been proposed to increase the discriminating property for the extraction process of the texture feature. There are six variants included in LBP which are Dominant LBP (DLBP), Completed Modelling of LBP (CLBP), Center-Symmetric Local Binary Pattern (CS-LBP), Local Ternary Pattern (LTP), Completed Ternary Pattern (CLTP) and Local Orientation Adaptive Descriptor (LOAD)(Zhao, Jia, Hu, & Min, 2013).

All the previous texture descriptors are used the intensity value to be extracted. They are totally ignored any colour information. All the above descriptors proposed based on the gray values only and it is difficult to use it for any color image task. Some results are used these descriptors in their system after converting the color image to the gray image(Guo, Zhang, & Zhang, 2010).

1.2 Problem Statement

Most of the local texture descriptors had been shown good performance for many of image processing tasks. However, most of them only focused on the intensity values of the images and totally ignored the colour information even if the image is a color image. In the color image classification using normal texture descriptors, they just converted the image from color to gray and then extract the texture descriptor. While, the color is one of the important information in the image. Considering the color information may led to improve the accuracy of the classification or recognition that lead to high and good results. Moreover, there are different color models and each model has its advantage and disadvantage. Use different color models to extract different color texture descriptor instead of gray texture descriptor may help to improve the performance of the texture descriptor.

1.3 Objectives

i. To study and investigate different texture local pattern features

ii. To study and apply different color local texture pattern descriptors for color texture classification

iii. To evaluate the performance of different color local texture pattern descriptors for color texture classification

1.4 Scope

i. This research will focus in colour texture image classification.

ii. Only three existing colour texture datasets are used. These are KTH-TIPS, KTH-TIPS 2A and Outex_TC_00013.

1.5 Thesis Organization

This thesis consists of five chapters and each chapter discuss different issues in the system. Below is the summary for all the chapters in the thesis:

Chapter 1 is an introduction which contains problem statement, objectives and scope of this research.

Chapter 2 is literature review which reviews three previous texture descriptors.

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